REMARKS

This paper is responsive to the Office Action dated August 26, 2004. The issues outstanding in this application are:

- The drawings are objected to.
- The incorporation of matter into the specification is objected to.
- Claims 8-12 are objected to because of informalities.
- Claims 2-7 and 10-12 are rejected under 35 U.S.C. § 112, second paragraph.
- Claims 8-12 are rejected under 35 U.S.C. § 102(b).
- Claims 1-7 are rejected under 35 U.S.C. § 103(a).

Claims 8-9 are canceled without prejudice, claims 5 and 12 are original, claim 1 is previously presented, claims 2-4, 6-7, 10-11 are currently amended, and new claims 13-27 have been added. Claims 1-7 and 10-27 are pending in this application. No new matter has been added.

Priority:

The Office Action acknowledges that Applicant has properly claimed priority to provisional application serial No. 60/446,596. The Office action further notes that Applicant did not claim domestic priority to this provisional application in Applicant's Declaration filed on June 14, 2004. Applicant notes that there is no requirement to claim priority in the Declaration and that Applicant's claim to priority in the first sentence of the specification is sufficient. Accordingly, no action has been taken in connection with the "priority" section of the current Office Action.

Objections to the Drawings:

The drawings are objected to because Figure 1, as filed, lacked a label. The label "FIG. 1" has now been added in a drawing replacement sheet accompanying this response. Applicant respectfully solicits entry of the amended drawing. No new matter has been added.

Objection to the Specification:

The Examiner requires that the disclosure be amended to include the material incorporated by reference. In this paper, Applicant has enclosed a copy of the provisional application as filed for attachment to the non-provisional application as an appendix. In addition, Applicant has amended

specification paragraphs [0001], [0015], [0017], [0019], [0020], and [0023] to comply with the requirement in the Office Action. Moreover, in certain cases, equations and/or new text paragraphs have been added after some of the listed paragraphs to more fully explain the subject matter therein. In other cases, text has been added directing a reader to the provisional document which has been added as an appendix. Where suitable, spelling errors have been corrected in the matter cut and pasted into the amended specification paragraphs from the incorporated document.

Support for the matter added to the specification right after paragraph [0017] may be found on pages 5-6 of the provisional application. Support for the addition of equation 13 to the specification, after paragraph [0019], may be found on page 8 of the provisional application. Support for the addition of equation 18 to the specification, in the paragraph succeeding paragraph [0020], may be found on page 9 of the provisional application. Support for the matter added to the specification, after paragraph [0023], may be found on pages 9-11 of the provisional application.

As required in the Office Action, Applicant has also enclosed an affidavit stating that the amendatory material consists of the same material incorporated by reference into the non-provisional application. No new matter has been added.

Applicant is submitting the enclosed declaration to fully respond to the requirements of the Office Action and to advance the prosecution of this application. However, in submitting the enclosed declaration, Applicant does not concede that the matter incorporated by reference into the non-provisional application as filed is "essential matter."

Objections to the Claims:

Claims 8-12 are objected to because the term "PDF" was not fully spelled out in claim 8. Claims 8-9 have been canceled without prejudice. However, the term "PDF" has now been fully spelled out in claim 10. Moreover, the term corresponding to the abbreviation "DFA" has also been fully spelled out in claim 10.

With respect to the Office Action's concern about DFA being an analysis and not being calculated, Applicant has amended claim 10 to include the term "vector" after the term "DFA". Thus, the claim now recites the calculation of a vector. All changes are supported in the specification as filed. No new matter has been added. Based on the foregoing, Applicant believes that the objections to the claims have been overcome by the amendments and remarks herein. Accordingly,

reconsideration is respectfully requested.

Changes to the Claims:

Claims 2-4 and 6-7 have been amended for clarity. The changes thereto are fully supported in the incorporated provisional application on page 5-6 and on page 3 of the non-provisional application. Claims 8-9 have been canceled without prejudice and their limitations incorporated into claim 10. Claim 10 has also been amended to add the expanded term "probability density function" on lines 2 and 3 and the expanded term "discriminating feature analysis" on line 8. Additional minor changes to claim 10 have also been entered to properly use definite articles before previously introduced items and to provide consistent terminology throughout.

Claim 11 has been amended to change the word "DFAs" to "DFA vector" for greater clarity. Support for this change may be found on page 3 of the non-provisional application. No new matter has been added.

In the following, the provisional application incorporated into this application is referred to as the "provisional." New claims 13-27 have been added. Claim 13-14 are supported between pages 7 and 9 of the provisional. Claim 15 is supported in paragraph 1 on page 7 of the provisional. Claim 16 is supported on page 16 of the provisional, prior to the heading for section 3.3. Claims 17-20 are supported in the last paragraph of page 17 and the first paragraph of page 18 of the provisional. Claims 21-27 are supported in the last paragraph of page 18 and in the first two paragraphs of page 19 of the provisional. No new matter has been added.

Rejection under 35 U.S.C. § 112:

Claims 2-7 and 10-12 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. For claims 2-7, the Office Action asserts that the meaning of "discriminating feature analysis (DFA) vector is not clearly defined in the specification. Discriminating Feature Analysis is discussed in section 3.1, on page 5, of the provisional application which is incorporated into this application. The "discriminating feature vector" resulting from the discriminating feature analysis is fully described on page 6 of the incorporated provisional application. The term "discriminating feature analysis (DFA) vector" used in this non-provisional application and in the claims represents a minor change in terminology with respect to the original term "discriminating feature vector." However, Applicant contends that the term "discriminating feature analysis (DFA) vector" is

nevertheless fully enabled and definite in light of the discussions in the incorporated provisional application and the description in this non-provisional application. This term is also supported on page 3 of the non-provisional application.

The Office Action asserts that there is insufficient antecedent basis for the term "the discriminating feature analysis (DFA) vector" in claims 2-7. Claim 2 has been amended to recite "a" instead of "the" prior to the term "discriminating feature analysis (DFA) vector." Accordingly, claim 2, and claims 3-7 which depend therefrom, are definite.

Claims 10-12 are rejected as being indefinite due to the recitation of "the DFA" in claim 10. Claim 10 has been amended to replace the term "the DFA" with the term "a DFA vector." Claim 11 has been amended to replace the term "the DFAs" with the term "the DFA vector." Accordingly, claims 10-12 are now definite. In view of the foregoing, Applicant respectfully requests reconsideration of the rejection under 35 U.S.C. § 112, second paragraph.

Rejection under 35 U.S.C. § 102(b):

Claims 8-12 are rejected under 35 U.S.C. § 102(b) as being anticipated by Yang et al. ("Detecting Faces in Images: a Survey," Yang, Ming-Hsuan et al., IEEE Trans. On Pattern Analysis and Machine Intelligence, v. 24, no. 1, January 2002, hereafter Yang). "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Applicant contends that Yang does not describe all the elements of claims 10-12 and therefore does not anticipate these claims under 35 U.S.C. § 102.

Claims 8-9 have been canceled without prejudice, and their limitations have been incorporated into amended claim 10. For the reasons stated herein, claims 10-12 are patentable over the rejection of record. Claim 10 recites the limitation "wherein the PDFs of the face and nonface classes are calculated only after first calculating a DFA (Discriminating Feature Analysis) vector of each of a plurality of training images." Applicant shows, in the section responding to the 35 U.S.C. § 103 rejection below, that Yang does not describe the DFA vector recited in Applicant's claims. Therefore, Yang also does not describe calculating a DFA vector of each of a plurality of training images. Accordingly, Yang does not describe all the elements of claim 10 and does not anticipate claim 10.

Claim 11-12 depend from claim 10, inherit all the limitations thereof, and are therefore patentable over Yang for the same reasons as claim 10. Moreover, claims 11-12 also define further novel, nonobvious limitations not described in the prior art. Accordingly, claims 10-12 are patentable over Yang under 35 U.S.C. § 102(b). Thus, reconsideration is respectfully requested.

Rejection under 35 U.S.C. § 103(a):

Claims 1-7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yang in view of Go (U.S. Patent No. 5,761,341, hereafter "Go"). To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. § 2143. Without conceding the second or third criteria, Applicant asserts that the first criterion is not met by the combination of references provided in the Office Action. The Office Action section rejecting claims under 35 U.S.C. § 103 is presented in two parts, and this paper responds to them separately in this section.

On page 6, the Office Action alleges the teaching of various of Applicant's limitations by Yang and asserts a basis for combining these teachings. Specifically, the Office Action asserts that Yang teaches calculating "edge representation." However, Applicant does not claim this feature. Accordingly, the asserted teaching of this feature by Yang is not relevant to the rejection of Applicant's claims.

The Office Action also asserts the teaching of combining several features for facial recognition, pointing to the first paragraph of section 2.2.4 of Yang. However, Applicant's claims do not recite "facial features." Instead, the Office Action assertion on this point appears to refer to the discriminating "feature" analysis (DFA) vector analysis recited in claim 2. However, this "feature" is recited within the context of a feature vector representing a mathematical operation not a specific physical subset of a human face. Thus, the "multiple features" of section 2.2.4 of Yang do not teach or suggest Applicant's DFA vector.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2143. In alleging a motivation to

combine various elements of Yang to meet the limitations of Applicant's claims, the Office Action asserts, on page 6, that "[i]t is desirable to improve accuracy of facial recognition" and that "this combination improves accuracy of facial recognition." However, the Office Action has not identified any suggestion for the proposed combination of features of Yang in the reference. Thus, Applicant contends that the Office Action has drawn the suggestion to combine from Applicant's disclosure rather than from the prior art, which contradicts the above-quoted rule. Accordingly, Applicant asserts that there is insufficient motivation to combine the features discussed in Yang to meet the limitations of Applicant's claims.

The Office Action concedes that Yang does not teach the use of a 1-D Haar wavelet representation as recited in claim 1. The Office Action employs Go to supply this teaching. The Office Action asserts, on page 7, that "[i]t is desirable to be flexible in processing image for facial recognition. Because 1-D Haar wavelet operation is one of edge determining processes, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to include 1-D Haar wavelet operation to generate Yang's edge maps as part of feature vector because this combination provides process flexibility." Applicant respectfully contends that the asserted motivation to combine reference teachings has once again been drawn from Applicant's disclosure and not from the prior art.

Applicant's invention, as presently defined by claim 2, requires that a face be detected by forming the DFA vector of the image, which includes the 1-D Haar representation, the input image, and the amplitude projections, as defined at paragraph 17.1 of the specification. Go teaches nothing more than the fact that the 1-D Haar representation of an image is known in the art. Applicants do not disagree. Go teaches however, to encode a known image with the Haar representation, and then to decode it. Go does not teach the detection of faces with a Haar representation combined with two other parameters. Even if Go were combined with Yang, the images being processed in Yang could be encoded and decoded using a Haar representation. But, even the combination would not teach the detection of faces using the Haar 1-D algorithm and two other parameters, as presently claimed by Applicant, because the use of the Haar representation to detect faces with other parameters, the critical teaching missing from Yang, is not supplied by Go.

Additionally, although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430, 1432.); M.P.E.P. § 2143.01. In this case, there is no suggestion

in either reference to combine the reference teachings as proposed in the Office Action. Accordingly, Applicant respectfully contends that the Office Action improperly draws the stated motivation to combine the references from Applicant's own disclosure.

Moreover, Applicant contends that one of skill in the art of face detection would not have looked to Go for guidance in improving a face detection system. A prior art reference is analogous if the reference is in the field of applicant's endeavor or, if not, the reference is reasonably pertinent to the particular problem with which the inventor was concerned. *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992); M.P.E.P. § 2145. For the reasons stated below, Applicant contends that Go is non-analogous art.

Applicant's field of endeavor is the detection of faces within images. In Go, the field of endeavor is image encoding and decoding for the purpose achieving efficient data compression. In the face detection art, the challenges or problems confronting those of skill in the art concern the recognition of faces under varying circumstances. In Go, the problems reside in managing the tradeoff between the efficiency of data compression and the accuracy with which data is retrieved upon decompression. See Go, col. 1, lines 49-52.

Clearly, both the fields of endeavor and the problems confronted by Applicant and Go are different. The subject matter of Go, dealing as it does with data compression, would not logically have commended itself to the attention to one of skill in the art of face detection in considering the problems of that art. Go is therefore non-analogous art. See *Wang Laboratories INC. V. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767 (Fed. Cir. 1993) and M.P.E.P. § 2141.01(a). In view of the foregoing, there is insufficient motivation to combine the teachings of Yang and Go.

The Office Action relies upon Go to supply the teaching of the Haar wavelet representation of claim 1. Since there is insufficient motivation to combine Go with Yang, Applicant asserts that the prima facie case of obviousness for claim 1 under M.P.E.P. § 2143 fails and that claim 1 is therefore patentable over Yang in view of Go under 35 U.S.C. § 103(a). Claims 2-7 depend from claim 1, inherit all the limitations thereof, and are therefore patentable over Yang in view of Go for the same reasons as claim 1. Moreover, claims 2-7 recite further novel, nonobvious limitations not taught or suggested by the prior art. Limitations of a selection of claims dependent claims 2-7 are discussed below.

Regarding claim 2, Applicant has already shown that the "facial features" of Yang, referred to

by the Office Action on page 6, do not correspond to the discriminating feature analysis (DFA) vector of Applicant's claim 2. Accordingly, claim 2 recites patentable features in addition to those it inherits from claim 1 from which it depends.

Claim 3 recites "wherein a plurality of DFA vectors are formed based upon training images". Yang and Go do not teach or suggest the DFA vector itself and therefore don't teach or suggest forming DFA vectors using training images. Accordingly, claim 3 recites patentable features in addition to those it inherits from claim 2 from which it depends.

Claim 4 recites "wherein said DFA vectors from said training images are used to model face and non face classes . . . ." Yang and Go do not teach or suggest Applicant's DFA vectors and therefore also don't teach or suggest using the DFA vectors for modeling face and non-face classes. Accordingly, claim 4 recites patentable features in addition to those it inherits from claim 3 from which it depends.

Claim 6 recites calculating the DFA vector of an input image to be analyzed. Yang and Go do not teach or suggest the DFA vector and therefore also do not teach calculating the DFA vector of an input image to be analyzed. Accordingly, claim 6 recites patentable features in addition to those it inherits from claim 5 from which it depends.

Claim 7 recites "using said DFA vector of said input image to classify the image using a Bayesian classifier." Yang and Go do not teach or suggest the DFA vector itself and therefore also do not teach or suggest using the DFA vector to classify the image using a Bayesian classifier. Accordingly, claim 7 recites patentable features in addition to those it inherits from claim 6 from which it depends.

Patentability of the New Claims:

New claims 13-27 have been added in this response. Claim 13 recites the limitation "modeling a subset of said nonfaces which lie closest to said face class." The art applied in this application does not teach or suggest this limitation. Accordingly, claim 13 is believed to be patentable over the prior art. Claims 14-16 depend from claim 13, inherit all the limitations thereof, and are therefore believed to be patentable over the prior art for the same reasons as claim 13.

Claim 17 recites the limitation "eliminating an area of said input image from further searching based on said detection of said first face sub-image." The applied art does not teach or suggest this

limitation, and claim 17 is therefore believed to be patentable over the prior art. Claims 18-20 depend from claim 17, inherit all the limitations thereof, and are therefore believed to patentable over the prior art for the same reasons as claim 17.

Claim 21 recites the limitation "if said sub-image is homogeneous, excluding said sub-image from further processing within a face detection algorithm." The applied art does not teach or suggest this limitation. Accordingly, claim 21 is believed to be patentable over the prior art. Claims 22-27 depend from claim 21, inherit all the limitations thereof, and are therefore believed to be patentable over the prior art for the same reasons as claim 21. In view of foregoing, new claims 13-27 are believed to be patentable.

Conclusion:

The applicants therefore respectfully request reconsideration and allowance in view of the above remarks and amendments. The Examiner is authorized to deduct additional fees believed due from our Deposit Account No. 11-0223.

Respectfully submitted,

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Dated: Jan. 14, 2005

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal service as first class mail, in a postage prepaid envelope, addressed to Mail Stop Amendment, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on Jan. 14, 2005.

Dated Jan. 14, 2005 Signed Paula M. Halsey Print Name PAULA M. HALSEY

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